

# THE EFFECTIVENESS OF GAME-BASED LEARNING METHODS ON THE KNOWLEDGE AND ATTITUDES OF CLASS V STUDENTS IN THE PREVENTION OF DIARRHEA DISEASE

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## ABSTRACT

**Introduction:** Diarrhea is one of the main causes of death and suffering of children in the world. Lack of knowledge of school-age children about diarrhea can be one of the causes of diarrhea cases. The Game-Based Learning (GBL) method can be used to prevent diarrhea by increasing the knowledge and attitudes of school-age children. **Objectives:** To measure the effectiveness of the GBL method in increasing the knowledge and attitudes of fifth-grade students about diarrhea as an effort to prevent diarrhea at SDN Malaka Jaya 08 & SDN Pondok Kelapa 05 Pagi, East Jakarta. **Methods:** This study applies Quasi Experiment Design using the Non-Equivalent Control Group Design model with a sample size of 70 fifth grade students selected using purposive sampling technique. Data analysis using non-parametric test methods, namely the Wilcoxon Signed-Rank test and the Mann-Whitney test. **Results:** The Game-Based Learning method has an effect on students' attitudes and knowledge ( $p = 0.000$ ). The average knowledge and attitudes of students in the intervention group experienced a significant increase compared to the control group. **Conclusions:** Health education using a GBL method is effective in improving the knowledge and attitudes of school-age children as an effort to prevent diarrhea. **Keywords:** Game-Based Learning; Knowledge; Attitude

## ABSTRAK

**Latar Belakang:** Diare menjadi salah satu penyebab utama kematian dan penderitaan anak di dunia. Kurangnya pengetahuan anak usia sekolah mengenai diare dapat menjadi salah satu penyebab terjadinya kasus diare. Metode Game-Based Learning (GBL) dapat digunakan dalam mencegah diare melalui peningkatan pengetahuan dan sikap anak usia sekolah. **Tujuan:** Mengukur efektivitas metode GBL dalam meningkatkan pengetahuan dan sikap siswa kelas V tentang penyakit diare sebagai upaya pencegahan kejadian diare di SDN Malaka Jaya 08 & SDN Pondok Kelapa 05 Pagi, Jakarta Timur. **Metode:** Penelitian ini menggunakan Quasi Experiment Design dengan model Non-Equivalent Control Group Design dengan jumlah sampel 70 siswa kelas V yang dipilih menggunakan teknik purposive sampling. Analisis data menggunakan metode uji non parametrik yaitu uji Wilcoxon Signed-Rank dan uji Mann-Whitney. **Hasil:** Metode Game-Based Learning memberikan pengaruh pada sikap dan pengetahuan siswa ( $P = 0.000$ ). Rata-rata pengetahuan dan sikap siswa pada kelompok intervensi mengalami peningkatan yang signifikan dibandingkan dengan kelompok kontrol. **Kesimpulan:** Pendidikan kesehatan menggunakan metode Game-Based Learning efektif dalam meningkatkan pengetahuan dan sikap anak usia sekolah sebagai upaya pencegahan diare. **Kata Kunci:** Game-Base Learning; Pengetahuan; Sikap

## **INTRODUCTION**

Diarrhea is a significant health problem in developing countries such as Indonesia and became the major cause of death and illness in children worldwide. It is the second leading cause of death in children under five, with around 525,000 children dying each year. Diarrhea can cause malnutrition which has the potential to result in death and Extraordinary Events (KLB). This problem occurs mostly due to contaminated food and air sources and poor knowledge of sanitation (Tuang, 2021; WHO, 2017).

The World Health Organization (WHO) reports that each year there are around 2 billion cases of diarrhea, with 1.9 million children under five dying (WHO, 2020). Of the total deaths due to diarrhea, 78% occur in developing countries, especially in Southeast Asia, including Indonesia. Based on Riskesdas (2018), the prevalence of diarrhea in the age group under 1 year was recorded at 18,225 cases (9%), while in the age group 1-4 years it reached 73,188 cases (11.5%). In the age group 5-14 years, the number was 182,338 cases (6.2%), and in the age group 15-24 years, it was recorded at 165,644 cases (6.7%) (Kemenkes RI, 2019). According to the World Health Organization, as many as 100,000 children die in the world due to diarrhea, of which deaths in children aged 4-11 years caused by diarrhea are 25.5% (WHO, 2020). These data show that diarrhea is still a significant health challenge, especially in younger age groups, and requires more creative and innovative attention and prevention efforts.

Data from the Central Statistics Agency (BPS) regarding the number of disease cases in DKI Jakarta states that in 2020 there were 14,872 cases of diarrhea, in 2021 there were 12,664 cases, and in 2022 there were 51,177 cases of diarrhea in toddlers. This shows that in 2022 there was a fairly high increase in cases compared to the previous year. East Jakarta is the area with the second highest number of diarrhea cases after West Jakarta in DKI Jakarta in 2020, namely 3,768 cases and in 2021 there were 3,117 cases (BPS, 2022). These data show that East Jakarta has a fairly high number of diarrhea cases and this problem is a special concern for the government.

The incidence of diarrhea in schools can be caused by a lack of knowledge of school-age children. Providing health education to school-age children can be one way to prevent cases of diarrhea in children. Ulfa (2021) stated that children's knowledge has a significant effect on the incidence of diarrhea ( $P = 0.017$ ). Knowledge is information known by humans about something that can be obtained from various sources, knowledge is very important in human life as an individual or social being. According to Sari (2016), knowledge can influence a person's attitude or behavior including in the scope of health. Hence, it is essential to implement health education to enhance awareness about diarrhea, covering its causes, prevention, and treatment. This approach aims to

promote healthier behaviors and attitudes within the community. One form of health education that utilizes technology is the Game-Based Learning (GBL) method.

Game-Based Learning (GBL) is a learning method that uses game applications to support the learning process in a fun way through playing activities. This model aims to improve students' knowledge and skills through interesting interactions (Azan & Wong, 2008; Kembau et al., 2023; Maulidina et al., 2018). Research by Dahroni et al. (2023) on the implementation of Game-Based Learning for the prevention of COVID-19 in Elementary Schools showed an average increase of 24.89% in awareness and prevention of COVID-19 after playing games. The findings of Agil & Nurdiantami (2021) regarding the effectiveness of the GBL method as a medium for Clean and Healthy Living Behavior (PHBS) education for children showed a significant difference after intervention in children's attitudes towards brushing their teeth where children's oral hygiene improved after being given education with the Game-Based Learning method.

Research on the application of GBL as an effort to prevent diarrhea has not been widely explored, so the author was challenged to research the effectiveness of the GBL method in improving children's attitudes and knowledge about preventing diarrhea. This study aims to measure the effectiveness of the Game-Based Learning method in improving the knowledge and attitudes of grade V students about diarrhea as an effort to prevent diarrhea at SDN Malaka Jaya 08 & SDN Pondok Kelapa 05 Pagi.

## **METHOD**

This study adopted a quantitative approach to assess the effectiveness of the applied method. The research design used was quasi-experimental, which allowed researchers to compare the results between the intervention group and the control group. The design chosen is the Non-Equivalent Control Group Design, which means that participants in the control group are not randomly selected, but have characteristics that can be compared with the treatment group. This research was conducted in October 2023. The population in this research consisted of fifth-grade students in two schools, namely SDN Malaka Jaya 08 and SDN Pondok Kelapa 05 Pagi. From this population, researchers took a sample of 70 respondents, which were divided equally into two groups, each consisting of 35 respondents. Grade V students were chosen as research subjects because grade V students have an age range of 10-11 years. This age range is a significant age period in cognitive and social development so they have higher abilities in thinking and arguing abstractly and have a better tendency to understand complex concepts related to disease prevention efforts. In addition, many studies use grade V students as research

subjects to see the effectiveness of various learning methods so that it is easier for researchers to compare and analyze research findings in the context of existing research. The researcher chose SDN Malaka Jaya 08 & SDN Pondok Kelapa 05 Pagi as the research location because there were cases of diarrhea in the area that required health education to improve students' knowledge and attitudes.

The Game-Based Learning method that will be used by the researcher in this study is an online-based game, namely "Wordwall" which can be accessed easily and practically without the need to print teaching materials and this online-based game is a form of development of the era by utilizing technology in the current era. The Game-Based Learning method contains information about the importance of washing hands, maintaining the cleanliness of food and drinks, and maintaining personal hygiene at school and at home.

The sampling technique in this study used a sampling technique with the Non Probability Sampling type, namely Purposive Sampling. Data collection was carried out using a questionnaire as a measuring tool. The data in this study were obtained through a test as a benchmark for students' ability to receive information about diarrhea as an effort to prevent diarrhea with the game-based learning method. The test was given to a research sample of 70 people who were divided into two groups, namely the intervention group and the control group. The data collection technique using tests was given in two forms, namely pre-test and post-test. In data analysis, researchers used non-parametric test methods, namely the Wilcoxon Signed-Rank Test to compare paired data in the same group, and the Mann-Whitney Test to compare two independent groups. With this approach, it is expected to obtain valid and reliable results in assessing the effectiveness of the methods applied in this study.

## RESULTS AND DISCUSSION

Respondent characteristics consist of age, gender, parental education, and parental occupation with the number of respondents in the intervention group being 35 students and the control group being 35 students.

Table 1. Respondent Characteristics in the Intervention Group and Control Group (n = 70)

Characteristics	Intervention Group		Control Group		Total	
	f	%	f	%	f	%
Gender						
Man	16	45.7	11	31.4	27	38.6

Women	19	54.3	24	68.6	43	61.4
Total	35	50	35	50	70	100
<hr/>						
Age						
10 – 11 Years	32	91.4	29	82.9	61	87.1
12 - 13 Years	3	8.6	6	17.1	9	12.9
Total	35	50	35	50	70	100
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Parent Education						
Low Education (No School, Elementary School, Middle School)	3	8.6	4	11.4	7	10
Higher Education (High School, College)	32	91.4	31	88.6	63	90
Total	35	50	35	50	70	100
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Parents' job						
Doesn't work	2	5.7	3	8.6	5	7.1
Work	33	94.3	32	91.4	65	92.9
Total	35	50	35	50	70	100

Table 1 shows that most of the respondents in the intervention group were female, namely 19 students (54.3%). Most of the respondents in the control group were also female, namely 24 students (68.6%). The analysis in this study found that gender did not affect the incidence of diarrhea, and did not affect students' knowledge and attitudes towards the problem. Research by Suherman & 'Aini (2019) also obtained similar results that gender was not significantly related to the incidence of diarrhea in school children. However, the results of this study contradict the research of Ibrahim et al. (2021) which stated that gender was significantly related to the incidence of diarrhea in school-age children, where male students experienced diarrhea more often because they were more often active outdoors when compared to female students.

The results of the frequency distribution based on age showed that most students were aged 10-11 years. The number of students aged 10-11 years in the intervention group was 32 students (91.4%) and 29 students (82.9%) in the control group. This study found that age was not significantly related to the incidence of diarrhea, knowledge, and attitudes of students. This finding is in accordance with the research of Suherman & 'Aini (2019) which stated that age does not have a significant effect on the incidence of diarrhea in school children.

The educational background of the parents was mostly highly educated (high school and college) with a total of 32 students (91.4%) in the intervention group and 31 students (88.6%) in the control group who had parents with higher education. The analysis conducted in this study showed that the level of parental education was not significantly related to the incidence of

diarrhea, knowledge, and attitudes of students. This result is different from the study by Rohaeti et al. (2020) which concluded that the level of parental education can affect the incidence of diarrhea. In addition, the study by Cahyani et al. (2022) also supports this statement which states that diarrhea in children can be treated by considering the level of parental education.

Parental employment status shows that most students have working parents, namely 33 students (94.3%) in the intervention group and 32 students (91.4%) in the control group. The analysis conducted in this study showed that parental employment was not significantly related to the incidence of diarrhea, knowledge, and attitudes of students. This finding is in line with the research of Ibrahim et al. (2021) which concluded that parental employment did not significantly affect the incidence of diarrhea in children. However, the results of this study contradict the research by Indahsari et al. (2020) which stated that the type of work and family income can affect health including the risk of diarrhea in children. Research by Cahyani et al. (2022) also emphasized that parental employment can have an impact on the incidence of diarrhea in school-age children.

Table 2. Level of Attitude and Knowledge of Respondents Before and After Intervention in the Intervention Group and Control Group (n = 70)

Measurement	Intervention Group			Control Group		
	Median	SD	p-value	Median	SD	p-value
Attitude						
Pre-Test	37.00	3.008	0.000	33.00	2.924	0.000
Post-Test	42.00	1.167		49.00	1.262	
Knowledge						
Pre-Test	8.00	1.060	0.000	8.00	1.092	0.000
Post-Test	11.0	0.426		9.00	0.785	

Table 2 shows that knowledge scores in both groups increased, but a more significant increase occurred in the intervention group compared to the control group. In addition, the p-value for the knowledge variables was 0.000 ( $p < 0.05$ ) which indicates a significant difference in the knowledge of respondents before and after the intervention. Thus, the use of the Game-Based Learning method has a positive effect on improving the knowledge of fifth grade students about diarrhea prevention. Research by Nuranisah and Kurniasari (2020) also obtained similar results, namely an increase in knowledge after intervention using the game method. Another study by Lestari and Huriah (2022) also obtained a p-value of 0.000 which showed a positive effect of using game media in increasing the knowledge of school-age children. Therefore, the results of

this study further strengthen the evidence that the GBL method is effective in increasing students' knowledge about diarrhea prevention.

According to Notoatmodjo (2021), the amount and quality of information received by a person also play a role in increasing a person's level of knowledge. If the information received is of good quality, it can result in the absorption of information and the effectiveness of the information can reach the target well. This also applies to health education, if health education efforts in elementary school students provide increased knowledge. This indicates that the information provided is good and fully accepted by students, resulting in longer memory of the information.

This study found that there was an effect of using the GBL method on improving the attitudes of fifth grade students in preventing diarrhea. These results are in line with the research of Munanda et al. (2020) which stated that health promotion through games had an effect on attitudes and knowledge about diarrhea in elementary school children ( $p = 0.000$ ). Similar results were also obtained by Nuranisah & Kurniasari (2020) who stated that there was an increase in the attitudes of elementary school students with a  $p$  value = 0.008. Lestari and Huriah (2022) also stated that there was an effect of using game media in improving the knowledge of school-age children ( $p$ -value = 0.022). Research by Hafni (2023) also found an increase in attitudes and knowledge in the group given intervention with games compared to other media in improving the knowledge of school-age students about diarrhea. Thus, the results of this study further strengthen the evidence that the GBL method is effective in improving students' attitudes towards preventing diarrhea.

According to the S-O-R theory, changes in attitudes can occur when the stimulus given exceeds the initial conditions. In this context, the use of the GBL method aims to change students' attitudes in preventing diarrhea. By using this method, the message or stimulus delivered can arouse students' motivation and enthusiasm. As a result, students will more quickly accept the information provided, which in turn can result in positive changes in attitude.

Table 3. Differences in Attitude and Knowledge Values Before and After Intervention with Game-Based Learning Method in the Intervention Group and Control Group ( $n = 70$ )

Measurement	Group	N	Mean Rank	p-value
Attitude	Intervention (Game-Base Learning Method)	35	52.21	0.000
	Control (Poster)	35	18.79	
Knowledge	Intervention (Game-Base Learning Method)	35	52.09	0.000
	Control (Poster)	35	18.91	

The results of the analysis in Table 3 show a p value of 0.000 ( $<0.05$ ) which indicates a significant difference in respondents' attitudes towards diarrhea prevention between the control group and the intervention group. This shows that the application of the Game-Based Learning method in the intervention group has a positive impact on improving students' attitudes in efforts to prevent diarrhea. The mean rank of knowledge in the intervention group was 52.21 while in the control group it was 18.79. This finding indicates that the GBL method is more effective in improving the attitudes of fifth grade students towards diarrhea prevention compared to the use of posters as the control group.

The statistical analysis of this study obtained a p-value of 0.000, indicating a significant difference in respondents' knowledge before and after the intervention. Research by Harsismanto et al. (2019) also stated that education using game media is more effective than poster media, as seen from a decrease in the level of attitudes and knowledge in the control group. Research by Ningsih et al. (2022) also supports these findings, stating that counseling using the game method has a positive impact on improving the attitudes and knowledge of elementary school students about preventing diarrhea in the experimental group.

This study found that the game method was more effective in improving students' knowledge and attitudes regarding diarrhea prevention. This was also expressed by Hafni (2023) where health education using games had a positive effect on students' knowledge and attitudes, while the flipchart method did not show a significant effect. Children tend to be more interested in activities that involve interaction with their friends. In the context of learning, the use of the game method is very effective because it can create a pleasant atmosphere and trigger enthusiasm for learning. When students are involved in the game, they feel challenged to compete and collaborate which can increase their motivation. In addition, the experience of learning through games allows students to more easily understand and remember the material being taught. Interaction in the game also helps them develop social and communication skills, which are very important in the learning process. The game method not only supports academic understanding but also provides a holistic and enjoyable learning experience.

In health promotion efforts to improve individual knowledge and attitudes, it is necessary to understand which five senses will be stimulated so that the absorption of material and respondents' memory of information can be carried out optimally. This finding is in line with the theory put forward by Notoatmodjo (2021), which states that the absorption of material through posters and leaflets only reaches 83%, while the use of games as a combination method can reach



96%. In addition, the memory associated with posters and leaflets is only 30%, while in the game method the memory increases by up to 90%.

## CONCLUSION

This research found that the majority of respondents were female, aged 10-11 years, had parents with higher education, and had working parents. Most students showed inadequate attitudes and knowledge before the intervention and after the intervention using the game method and the control group using posters, there was a significant increase in students' knowledge and attitudes. This study found that the GBL method was more effective in improving students' knowledge and attitudes in preventing diarrhea compared to the use of posters. This shows that the use of the GBL method is effective in preventing diarrhea in school-age children through increasing knowledge and attitudes.

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